

DETAILED ACTION

1. This office action is in response to the response filed March 20, 2008.

Claims 2-4 and 11-20 were cancelled and claims 1, 5-10 and 21-29 are currently pending in this application.

Response to Arguments

2. Applicant's arguments with respect to claim 22 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 22 is rejected under 35 U.S.C. 102(b) as being anticipated by Funada et al. (Funada, US 4,705,360).

As shown in Fig. 3, Funada discloses an LCD device comprising:

a first substrate 2;

pixels disposed on the first substrate (corresponding to electrodes 3 and 4);

a second substrate 1 coupled to the first substrate 2;

a sealing member 7 creating a gap between the first substrate and the second substrate;

a liquid crystal layer 8 disposed in the gap; and

spacers 6 disposed in the liquid crystal layer 8,

wherein the LCD device comprises a display region (having an orientation film 5) for displaying images and a non-display region (without the orientation film 5) which does not display images;

wherein the display region includes the pixels;

wherein the non-display region is disposed between the display region and the sealing member 7;

wherein the spacers 6 are arranged only in the display region and not in the non-display region (see Abstract and col. 3, line 56 through col. 4, line 25); and

further comprising a depression (between the sealing member 7 and the ends of the orientation film 5) which receives excess liquid crystal from the liquid crystal layer so that the gap between the first substrate and the second substrate is substantially uniform in the display region (col. 4, line 45 through col. 5, line 20); and

wherein the depression is substantially vacant except for the excess liquid crystal.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Funada et al. (Funada, US 4,705,360) in view of Yanagawa et al. (Yaganawa, US 2002/0075442 A1).

Funade discloses an LCD device that is basically the same as that recited in claim 27 except for the spacers comprising a plurality of discrete spacers.

As shown in Fig. 25, Yanagawa discloses spacers SP comprising a plurality of discrete spacers for ensuring the gap between the substrates SUB1 and SUB2 (paragraph 22).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the LCD device of Funada with the teaching of Yanagawa by forming spacers comprising a plurality of discrete spacers in order to ensure the gap between the substrates (paragraph 22).

Re claims 28 and 29, as shown in Figs. 1-5 of Yanagawa, the spacers comprises a plurality of discrete spacers arranged in a matrix with a plurality of rows and columns, wherein the spacers are pole-shaped.

7. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funada et al. (Funada, US 4,705,360) in view of Kijima et al. (Kijima, US 6,259,500 B1).

The LCD device of Funada as described above includes all that is recited in claim 23 except for the depression having a height H satisfying a relationship of $H \Rightarrow (1/2) \times (1000 + L) \times [0.02d + [L \times (0.02d/1000)]]/L$ (micrometer), where the non-display region has a width L and the gap in the display region has an average value d.

Kijima discloses an LCD device having spacers formed in the display region and none of the spacers being formed in the non-display region (Fig. 8b).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to have the relationship $H \Rightarrow (1/2) \times (1000 + L) \times [0.02d + [L \times (0.02d/1000)]]/L$ satisfied (col. 16, lines 17-46), since one would be motivated to suppress the level of non-uniformity due to variation in cell thickness to an acceptable level so that a convex/concave profile can be provided (col. 16, lines 17-47). Ultimately this serves to help realize a uniform cell thickness across the entire panel and improve display quality (col. 5, lines 7-29).

Allowable Subject Matter

8. Claims 1, 5-10, 21 and 24-26 are allowed.

The following is an examiner's statement of reasons for allowance: none of the prior art of record fairly suggests or shows all of the limitations as claimed.

Specifically, re claim 1, none of the prior art of record discloses, in combination with other limitations as claimed, an LCD device comprising a depression formed on an inner surface of the first or second substrate, wherein the depression is located in the second part of the liquid-crystal layer corresponding to the non-display region, and the depression constitutes a buffer space which receives extra liquid crystal from the liquid crystal layer; and wherein the depression is substantially vacant except for the extra liquid crystal.

The most relevant reference, US 5,978,065 to Kawasumi et al. (Kawasumi), fails to disclose or suggest the claimed invention.

As shown in Figs. 5A and 5B, Kawasumi discloses an LCD device comprising spacer particles and depressions 9a and 9b (grooves) formed on inner surfaces of the

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first substrate 1 and the second substrate 2 respectively, wherein the depressions are located in the non-display region formed between the display region including pixel electrodes 104 and the sealing member 3 for receiving excess liquid crystal from the liquid crystal 4 (col. 7, line 52 through col. 8, line 39). Kawasumi also prefers to have the liquid crystal 4 mixed with the spacer particles for controlling the cell gap (col. 5, lines 53-55). However, Kawasumi is silent about arranging the spacer particles only in the display region and not in the non-display region.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms, can be reached at (571) 272-1787.

/Thoi V. Duong/ - Primary Examiner

June 11, 2008